BIOE 509: Point-of-Care Diagnostics
Fall 2015

Course Description:
This course provides an overview of diagnostic technologies that can be used at the point-of-care, including lateral flow assays, 2- and 3-D paper-based assays, and imaging based assays. Topics include the principles of assay design, validation and commercial development, with a focus on diagnostics for low-resource settings. The course includes a lecture and laboratory component, along with a team-based design project.

Prerequisites:
Graduate student standing in BIOE

Meeting Time and Location:
Lecture: T/R 9:25-10:40 AM
Laboratory: TBA

Course instructor:
Dr. Rebecca Richards-Kortum — BRC Room 519
rkortum@rice.edu — Office Hours: T 11-12 or by appointment

TA: Timothy Vu — Timothy.Vu@rice.edu

Method of Instruction:
The course will consist of readings, lectures, laboratories, and a final project.

Textbook:
Readings from the literature will be assigned on Owlspace.

Method of Evaluation:
Homework assignments will be given and will focus on material covered in lectures and laboratories. Students will complete two laboratory assignments, working in teams of four. Each student will be responsible for presenting two short summaries of a paper selected from the recent peer-reviewed literature. Students will complete a team-based final project to develop or evaluate a new POC diagnostic; results will be documented with a conference style abstract and presentation. One cumulative take-home exam will be given near the end of the semester.

Grading:

Homework	20%
Labs	25%
Presentations	10%
Project	25%
Mid-Term Exam	20%
Total	100%

If you believe that a mistake has been made in grading your HW, lab report, or exam, you have ONE WEEK to request a re-grade in writing. After one week has passed I will not consider any requests to re-grade your work.

Homework: Printed homework assignments and lab reports are due at the beginning of class. Late assignments will have a 50% maximum grade and will only be accepted one week after the assigned due date. Homework should be your own, but general methods of working problems may be discussed with others.

Exams: One take home exam will be given near the end of the semester.

Honor System Policy: As with all endeavors at Rice, you are expected to adhere to the Honor Code and follow the guidelines given in the Blue Book. Exams are given under the honor system. Students are encouraged to work together collaboratively on the projects, but each student is expected to contribute an equal share to the final project. Students are encouraged to bring any concerns involving academic integrity to the attention of the instructor. More information can be found at www.ruf.rice.edu/~honor.

Disabilities: If you have a documented disability that requires accommodation, please let me know so that we can confidentially discuss your needs. You will also need to register with the Disability Support Services Office in the Ley Student Center.

Day	Date	Lecture Topic	Readings	Assignments
Unit 1: Overview & Test Characterization				
T	8/25	Intro to POC Tests and Test Characterization	Clinical Need & Evaluation Papers	
TH	8/27	Designing POC Tests for Maximum Impact	Clinical Need & Evaluation Papers	
Unit 2: Flow-Based POC Tests				
T	9/1	Lateral Flow Tests	Lateral Flow Test Papers	
TH	9/3	Lateral Flow Tests	Lateral Flow Test Papers	HW 1 Due
T	9/8	No Lecture – Lab 1		
TH	9/10	No Lecture – Lab 1		
T	9/15	No Lecture – Lab 1		
TH	9/17	No Lecture – Lab 1		
T	9/22	2D Paper Networks	Paper Networks Papers	
TH	9/24	2D Paper Networks	Paper Networks Papers	Lab 1 Due
T	9/29	3D Paper Networks	Paper Networks Papers	
TH	10/1	No Class		
T	10/6	Nucleic Acid Tests	Nucleic Acid Test Papers	Complete Present. #1
Unit 3: Imaging-Based POC Tests				
TH	10/8	Cell Based Assays – Gold Standards, Needs for POC		HW 2 Due
T	10/13	**No Class – Fall Break**		
TH	10/15	POC Microscopy	POC Microscopy Papers	Project Proposal Due
T	10/20	No Class		
TH	10/22	POC Cytometry	POC Cytometry Papers	HW 3 Due
T	10/27	POC Cytometry	POC Cytometry Papers	
TH	10/29	In Vivo Imaging	In Vivo Imaging Papers	Complete Present. #2
T	11/3	No Lecture – Lab 2		
TH	11/5	No Lecture – Lab 2		Mid-Term Exam Due
T	11/10	No Lecture – Lab 2		
Unit 4: Translating POC Tests into Clinical Practice				
TH	11/12	Regulatory Commercialization and Adoption	Commercialization Papers	
T	11/17	No Lecture - Project		Lab 2 Due
TH	11/19	No Lecture - Project		
T	11/24	No Lecture – Project		
TH	11/26	**No Class – Thanksgiving**		
T	12/1	Presentations		
TH	12/3	Presentations		Project Abstract Due

Presentation Guidelines:

Must sign up in advance
7-10 minute presentation of article from peer-reviewed literature with 3-5 minute Q&A
5 slide maximum
Article must:
- Present primary data relevant to class topic that day (no reviews)
- Be published after 2011
- Not have been covered in class readings or lecture
- Be pre-approved by RRK

Day	Date	Lecture Topic	Presenter 1	Presenter 2	Presenter 3
Unit 1: Overview & Test Characterization					
TH	8/27	Designing POC Tests for Maximum Impact			
Unit 2: Flow-Based POC Tests					
T	9/1	Lateral Flow Tests			
TH	9/3	Lateral Flow Tests			
TH	9/22	2D Paper Networks			
T	9/24	2D Paper Networks			
TH	9/29	3D Paper Networks			
T	10/6	Nucleic Acid Tests			
Unit 3: Imaging-Based POC Tests					
TH	10/8	Cell Based Assays – Gold Standards, Needs for POC			
TH	10/15	POC Microscopy			
TH	10/22	POC Microscopy			
T	10/27	POC Cytometry			
TH	10/29	In Vivo Imaging			
Unit 4: Translating POC Tests into Clinical Practice					
TH	11/12	Regulatory Commercialization and Adoption			